end, there has been evolved through the ages a nerve mechanism of such infinite delicacy and precision that in some unknown manner it can register permanently within itself every impression received in the phylogenetic and ontogenetic experience of the individual; that each of these nerve mechanisms or brain patterns has its own connection with the external world, and that each is attuned to receive impressions of but one kind, as in the apparatus of wireless telegraphy each instrument can receive and interpret waves of a certain rate of intensity only; that thought, will, ego, personality, perception, imagination, reason, emotion, choice, memory, are to be interpreted in terms of these brain patterns; that these so-called phenomena of human life depend upon the stimuli which can secure the final common path, this in turn having been determined by the frequency and the strength of the environmental stimuli of the past and of the present.

Finally, as for life's origin and life's ultimate end, we are content to say that they are unknown, perhaps unknowable. We know only that living matter, like lifeless matter, has its own place in the cosmic processes; that the gigantic forces which operated to produce a world upon which life could exist, as a logical sequence, when the time was ripe, evolved life; and finally that these cosmic forces are still active, though none can tell what worlds and what races may be the result of their coming activities.

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THE CHESTNUT-BLIGHT PARASITE (ENDOTHIA PARASITICA) FROM CHINA

IN common with Dr. Metcalf[1] and some other pathologists the writers have believed in the foreign origin of the chestnut-blight and its causal organism.

Having first proved by thorough investigation[2] that the species of *Endothia* (*E. radicalis* (Schw.) De Not.) common on the chestnut in southern Europe is not an active parasite and is morphologically distinct from *E. parasitica* our attention was again turned to the orient. Previous efforts to get *Endothia* by correspondence from China and Japan have been fruitless.

Knowing Mr. Meyer's keenness of observation and facilities for examining chestnuts in China, it occurred to us to try to enlist his services in the search for the fungus. We took up the matter with Mr. Fairchild early in February, 1913. He heartily approved of the proposition and data were prepared and sent to Mr. Meyer. On June 28, as Mr. Fairchild has related, a letter was received from Mr. Meyer enclosing a small specimen of diseased chestnut bark collected June 3, 1913, near San tun ying, Chili Province, China. This specimen showed the characteristic mycelial "fans" in the bark and a few pycnidia which agreed exactly in macroscopic and microscopic characters with *Endothia parasitica*. Meyer's description of the disease on these Chinese chestnut trees (whose specific determination is still under investigation) also agreed with the behavior of the disease on some oriental chestnut trees in this country.

Cultures on cornmeal were made June 30 from the mycelium and from pycnospores from Meyer's specimen. The cultures from mycelium did not grow, but three of the four cultures made from pycnospores developed normally and appeared pure. Cultures of *Endothia parasitica* from American material were also made at the same time on the same medium for comparison. The development of the Chinese fungus was in all cases indistinguishable from that of American origin. The amount of growth, the color and character of the mycelium, time of appearance, abundance and distribution of pycnidia were so similar that it was impossible to tell the cultures

[1] Bur. Plant Ind., U. S. Dept. Agr., Bull. 121, pt. 6, 1908; also *Trans. Mass. Hort. Soc.*, 1912, pt. 1, pp. 69–95.

[2] C. L. Shear, "*Endothia radicalis* (Schw.)," *Phytopathology*, 3: 61, February, 1913.

apart. Twelve subcultures made from the original flasks also behaved exactly like *E. parasitica*. Fifteen pycnospore streak cultures on potato agar from the Chinese material and the same number from American material were made July 10. The development in all these cultures was the same, giving the characteristic growth and colors of the parasite as recently described by the writers.[3] The only difference noted was that the distinctive orange color of the mycelium at the base of the cornmeal agar slants began to show one day earlier in some of the Chinese than in the American cultures. Cultures of the parasite of both Chinese and American origin were also made on sterile chestnut twigs and on upright tubes of cornmeal agar and oatmeal in flasks. In all cases the organism behaved in exactly the same manner and gave a typical growth of the chestnut-blight fungus.

July 7 fourteen inoculations of several sprouts of *Castanea dentata*, eight to ten centimeters in diameter, were made in the vicinity of Washington with mycelium from one of the original cultures from the Chinese specimen. Within one week all inoculations showed evidence of disease. At the end of nine days the sunken areas of bark about the points of inoculation extended in some cases 1 to 1.5 cm. Microscopic examination showed well-marked typical mycelial "fans" in the bark. At the end of two weeks all of the 14 inoculations were rapidly developing and showed diseased areas of sunken bark often extending 2 to 3 cm. from the line of inoculation. Many pycnidia were present, but no spore threads or horns had appeared. The characteristic mycelial "fans" were conspicuous in the bark. None of the five checks showed any signs of disease. At the last examination of the inoculations made August 11 all were developing rapidly. The largest canker was 6 cm. wide and 14 cm. long. Pycnidia of *Endothia parasitica* with extruding spore masses were abundant. Pycnospores from these cankers appear identical in shape and general appearance with those from the original Chinese specimen and also with those from American specimens. The measurements of the pycnospores are as follows:

From an American specimen:

Maximum length	6.15 microns.
Minimum length	3.42 microns.
Average length	4.69 microns.
Maximum width	2.3 microns.
Minimum width	1.84 microns.
Average width	2.09 microns.

From Meyer's Chinese specimen:

Maximum length	5.84 microns.
Minimum length	3.3 microns.
Average length	4.75 microns.
Maximum width	2.38 microns.
Minimum width	1.84 microns.
Average width	2.05 microns.

Specimens from inoculations with the Chinese fungus:

Maximum length	6.3 microns.
Minimum length	3.46 microns.
Average length	4.67 microns.
Maximum width	2.3 microns.
Minimum width	1.76 microns.
Average width	2.04 microns.

Meyer's first specimen showed no perithecia. On July 23 more Chinese specimens were received from the same locality. These included a large typical canker on a chestnut branch about 6 cm. in diameter which agreed in every respect with cankers produced on varieties of Japanese chestnuts in this country. Other specimens in this collection showed well-developed perithecia and ascospores. Measurements of 100 ascospores from the Chinese specimen gave a

Maximum length of	11.1 microns.
Minimum length of	6.9 microns.
Average length of	8.4 microns.
Maximum width of	5.3 microns.
Minimum width of	3.5 microns.
Average width of	4.39 microns.

The same number of measurements from a typical American specimen gave a

Maximum length of	10.8 microns.
Minimum length of	6.9 microns.
Average length of	8.49 microns.
Maximum width of	5.1 microns.
Minimum width of	3.6 microns.
Average width of	4.32 microns.

[3] "Cultural Characters of the Chestnut-Blight Fungus and its near Relatives," Circ. No. 131, B. P. I., Dept. Agr., July 5, 1913.

The uniformity and constancy of both the physiological and morphological characters of this fungus are quite remarkable and striking.

The Chinese organism has thus been shown to be practically identical with the American in all its morphological and physiological characters and in the production of the typical chestnut-blight and the pycnidial fructifications of the fungus. There is apparently but one other requirement that could be made according to the strictest pathological canons to perfect the proof in this case, and that is the production of typical ascospores of *E. parasitica* on the lesions produced by the inoculations. These could scarcely be expected to appear for some weeks yet. The evidence, however, appears to us sufficiently complete to allow no escape from the conclusion that *Endothia parasitica* occurs in China and in such a locality and under such conditions as would indicate that it is indigenous there.

Just as this note was finished, Mr. Fairchild received a package of photographs of blighted chestnut trees from Mr. Meyer, taken in the same locality from which the specimens were obtained. These will be published later. Suffice it to add here that the illustrations show clearly by the evident age of the trees and of the infections that this Chinese chestnut is much more resistant to the disease than the American and that there is much hope for the successful selection and breeding of resistant plants.

C. L. SHEAR
NEIL E. STEVENS
BUREAU OF PLANT INDUSTRY,
August 16, 1913

THE DISCOVERY OF THE CHESTNUT BARK DISEASE IN CHINA

MR. FRANK N. MEYER, agricultural explorer of the Office of Foreign Seed and Plant Introduction of the Department of Agriculture, during his first exploring trip in northern China, 1905–1908, visited the Pang shan region east of Peking. He reported upon the existence of considerable quantities of wild chestnuts there, where they "grow wild on the slopes of rocky mountains. . . . It is mostly found in groves, growing among rocks and bowlders, and even in its wild state it varies considerably in the size and flavor of its nuts and the spininess of the burrs. The Chinese name for the wild form is San li tze,"[1] otherwise spelled Shan-li-tze. At the time of Mr. Meyer's exploration in the Pang shan region, there was comparatively little interest in this country in the chestnut bark disease, and not being a plant pathologist, he did not look for the disease among the chestnut trees from which he gathered chestnuts for introduction into this country.

When it was announced that Mr. Meyer would make a second expedition to north China, the question was raised by Drs. Metcalf and Shear, of the Office of Forest Pathology, as to whether or not Meyer might be requested to search for the disease among these Chinese chestnuts. On February 26, 1913, therefore, at Dr. Shear's request, Mr. Meyer was asked to make a search for the disease, and in order to inform him specifically as to what to look for, specimens of the diseased bark were sent him.

On June 13, 1913, the American legation cabled the state department as follows: "Meyer requests the legation to report that he has discovered chestnut bark fungus. Seems identical with American form."

On June 28 a letter was received from Mr. Meyer, written June 4 from a Chinese inn in an old dilapidated town to the northeast of Peking, between Tsun hua tcho and Yehol. In it Mr. Meyer announces the sending of a small fragment of diseased chestnut bark.[2]

[1] Meyer, Frank N., "Agricultural Explorations in the Fruit and Nut Orchards of China," Bulletin No. 204, Bureau of Plant Industry, p. 52, March 25, 1911.

[2] SAN TUN YING, CHILI PROV., CHINA,
June 4, 1913.

MR. DAVID FAIRCHILD,
Agricultural Explorer in Charge,
U. S. Department of Agriculture,
Washington, D. C., U. S. A.

Dear Mr. Fairchild: Here I am sitting in a Chinese inn in an old dilapidated town to the northeast of Peking, between *Tsun hua tcho* and